Effect of dietary protein and lipid level on growth performance of tiger grouper *Epinephelus fuscoguttatus* during late-stage grow-out

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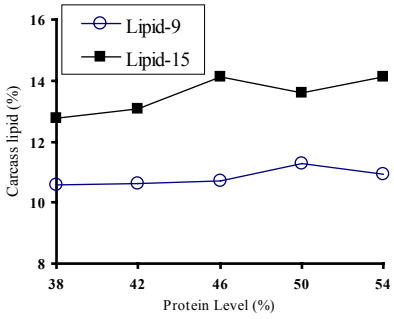
Groupers are potentially important aquaculture species since they have a high economic value. Groupers, predominantly *Epinephelus* spp. have been cultured throughout Asia for many years based on captured wild seed and the fish reared on trash fish. Availability of compounded feed to replace trash fish is an important stage on grouper culture development. Protein and lipid are the major nutrients component of fish feed. Juvenile tiger grouper (11 to 100g) require diet containing 47 to 50% crude protein and 9% lipid for its good growth (Giri *et al*., 2004; Laining et al., 2004). However, there is no information on dietary nutrient requirement for larger size of grouper (>250g). This additional information is required to develop cost-effective feed through out the culture period. The objective of the present study is to find out the effect of dietary protein and lipid on growth performance of tiger grouper during late-stage grow-out.

Material and methods

Ten test diets were prepared to contain five levels of dietary protein, i.e. 38, 42, 46, 50, and 54% and two levels of dietary lipid, i.e. 9 and 15%. All diets have the same energy content of 3.4 kcal/g. Fish meal, casein, squid liver meal, shrimp head meal and soybean meal were used as protein sources. Diets were prepared as dry pellets, 12 mm in diameter. Feeding experiments were conducted in 30 floating net cages (1x1x1m^3) in Pegametan Bay, Buleleng-Bali. Forty fish at average weight of 274.4 g were stocked in each net cage. The experiment was a completely randomized design with two factors (protein and lipid level), and three replications for each treatment. Fish were fed test diet once daily in the afternoon to satiation level for 180 days.

Lipid content in carcass of tiger grouper fed test diets.



Results and discussion

The result of the experiment showed there was no interaction effect between the protein and lipid content of diet for weight gain, survival, and FCR. Increasing protein levels in the diet from 38% up to 54% did not significantly improve weight gain indicating dietary protein requirement of tiger grouper might be reduce in larger fish (Table 1). The present study indicated that a dietary protein 38% is sufficient to support good growth of larger (>250g) tiger grouper. This value is much lower compared to juvenile size of tiger grouper (11 g) that is reported to required 47% dietary protein (Giri et al., 2004) or 50% dietary protein for fish size of 50-100g Wt (Laining *et al*., 2004). Increasing levels of dietary protein showed better FCR (Table 1), indicated that tiger grouper consume more feed when protein content of diet is lower. Although the energy content of experimental diets is the same, fish prefer to utilize protein to meet their energy requirement over utilizing energy from lipid and carbohydrate sources. There was no significant effect of dietary lipid on weight gain, survival, and FCR of tiger grouper in the present study. Fish fed high lipid diet has higher carcass lipid content (Fig.2) indicating more energy of the diet was retained as body fat.

Conclusion

- Dietary protein 38% is sufficient to support good growth of larger (>250g) tiger grouper.
- Tiger grouper fed high lipid diets were fatter and more energy of the diet was retained as body fat.

References

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Table 1. Weight gain, survival rate and feed conversion ratio (FCR) of tiger grouper fed test diet for 180 days.

Dietary factor	Dietary level (%)	Weight gain (%)[2]	Survival (%)	FCR[3]
Protein	38	127.2^a	72.7^a	1.82^a
	42	122.6^a	79.4^a	1.66^{ab}
	46	117.8^a	70.3^a	1.81a
	50	134.4^a	74.1^a	1.63^{ab}
	54	128.1^a	76.1^a	1.48^b
Lipid	9	131.7^x	74.3^x	1.62^x
	15	120.3^x	74.7^x	1.74^x

1. Initial weight = 274.7 g. Values in the column followed by the same superscript are not significantly different (P>0.05).
2. Weight gain = (final weight – initial weight) x 100/initial weight.
3. FCR = dry weight feed (g)/wet weight gain (g).